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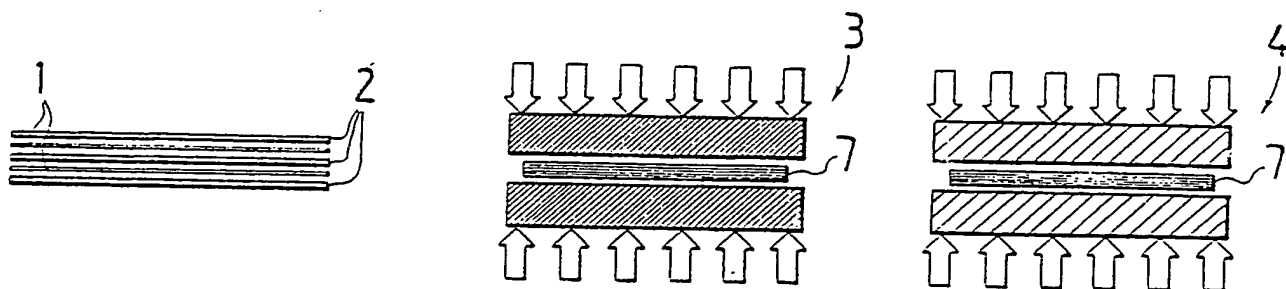
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(54) Title: METHOD FOR FABRICATION AND COATING OF BOARDLIKE ARTICLES



(57) Abstract

A fabrication and coating method of boardlike articles, wherein boards or sheets are fabricated or coated with e.g. veneer, paper, plastic film, sheet metal or some other separate coating. Gluing is effected with a thermoplastic adhesive by the application of two-step pressing in a manner that the adhesive is placed as a solid film (1) or as a powder between sections (2) to be joined together and thereafter in hot pressing (3) the plastic adhesive is heated to liquid state and in the immediately following cold pressing (4) said adhesive sets with descending temperature for binding said sections together.

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METHOD FOR FABRICATION AND COATING OF BOARDLIKE
ARTICLES

The invention relates to a method for the fabrication and coating of boardlike articles, as defined in the preamble of claim 1. The invention is applicable to the fabrication or coating of boards, such as plywood boards or the like, the fabrication or coating being effected with veneer, paper, plastic film, sheet metal, fiberglass fabric or some other separate coating.

At present, plywood manufacturing is carried out by using adhesives that set under the action of heat. An adhesive used almost exclusively in Finland is phenolic adhesive. The conventional manufacturing technique of available plywood is such that to both surfaces of every other veneer is applied a liquid adhesive mixture. A stack of thus obtained plywood blanks are cold pressed in a so-called preliminary pressing, the venners adhering together to such a degree that the blank stays intact during the transfers and its thickness is sufficiently small to be squeezed in between the plates of a hot press. Setting of the adhesive takes place in the hot press, whose temperature is usually appr. 130°C. The actual adhesive setting reaction requires a certain time and the transfer of heat to the middle of a board takes of course the longer the thicker a plywood is fabricated. In the presently available method, the hot-pressing time in the fabrication of a 6,5 mm thick plywood is appr. 6 min and in the fabrication of a 24 mm thick plywood appr. 15 min. The largest available hot presses comprise 30 apertures and are very expensive.

The quality of gluing raises continuously problems since a successful gluing is a result of so many factors that maintaining them all within controlled



limits is difficult. For example, the moisture variations of a venner, the quality variations of an adhesive resin and hardeners, extenders and fillers added therein and the trouble in mixing them raise continuous problems. Application of an adhesive mixture in liquid form is inconvenient: the applied amounts vary, the amounts applied on different sides of a veneer may be different, application is also partially manual work, leading to errors caused by human factors. In view of the successful gluing itself, an essentially significant factor is the uniformity of the amount applied; both too large and too small amounts applied result in the failure of gluing.

Essentially significant factors for successful gluing are ~~waiting times between the application of adhesive and pre-pressing and hot-pressing~~, said times depending on external conditions (temperature, relative humidity of air), partly on veneer properties (wood species, moisture, temperature), and thirdly on adhesive mixture. Efforts have been made to control these problems e.g. by revising an adhesive recipe as the case may require.

When using the available adhesives, more than half of the adhesive mixture is water. Therefore, the moisture of veneers must be extremely low, in practice below 5 %, to achieve a successful hot-pressing. If a veneer blank contains too much water during hot-pressing, the plywood will split because of vapour pressure when the press is opened, resulting in a defective product.

An object of the invention is to eliminate the above drawbacks impairing the fabrication and coating methods of boardlike articles.

As for the characterizing features of the invention, reference is made to the annexed claims.

By virtue of the invention, the above-stated



drawbacks can be essentially improved. Particularly, in the fabrication of plywood, substantially shorter pressing times are achieved. The invention further leads to a substantial cutback of capital costs since, according to the invention, multi-aperture presses
5 can be replaced by a single-aperture press or a continuous-action press.

Further by virtue of the invention, the procedure of gluing is considerably simplified. In the method of the invention, an adhesive can be delivered
10 to the factory as a perfectly ready-made film which requires no processing at all at the factory, nor is it necessary to add anything therein. The application of an adhesive, i.e. said film, is perfectly trouble-free as the film is simply placed between
15 veneers. Furthermore, the amount of adhesive, i.e. film, applied can be maintained exactly the same. There is no risk of leaving behind spots with no adhesive at all.

Moreover, by virtue of the invention, the
20 adhesive mixing and application steps are completely left out, resulting in substantial savings both in capital and labour costs.

The method of the invention is also highly reliable in terms of adhesive setting and successful
25 gluing, since all that must be taken care of is that an adhesive film softens sufficiently in hot-pressing and that enough pressure for the veneers to stick to each other is applied in cold-pressing when the adhesive is setting.

30 Further, by virtue of the invention, the moisture of veneers in plywood fabrication can be higher than in the available methods, since no additional water enters a plywood blank with the adhesive. This cuts down substantially the drying costs of
35 veneers, since there is no need for them to be as dry



as at present and the intermediate storage problems of veneers are reduced. In addition, in terms of plywood properties it is advantageous to have the moisture of a veneer higher at the time of fabrication than what is available at present.

The invention further facilitates the fabrication of plywood on a continuous-action line.

In terms of working hygienics, the method of the invention is highly preferable, since the workers need not handle the adhesive in liquid form, nor is it necessary to mix chemicals or additives in the adhesive. Furthermore, no harmful substances evaporate from adhesive into air and no adhesive waste ends up in waterways even with washing waters.

Moreover, the storage of adhesive, i.e. film, is completely trouble-free and the storage time is practically unlimited.

The invention will now be described in detail by way of work examples with reference made to the accompanying drawing, in which

fig. 1 is a schematic view of one application of a method of the invention shown stepwise, and

fig. 2 shows another application of a method of the invention also in schematic view.

Referring to fig. 1, in the first step (on the left) two adhesive films 1 are placed between three veneers 2 followed by hot-pressing a thus obtained plywood blank 7 in a hot press 3 in the following step (in the middle of the sheet). In hot-pressing, said adhesive films 1 melt and glue veneers 2 together. Following the hot-pressing, the obtained plywood is transferred to a cold press 4 (on the right), and the adhesive is set by means of a said cold press.

Fig. 2 shows schematically a plywood fabrication method according to one application of the invention in continuous action, a plywood blank, i.e.

veneers with adhesive film placed therebetween, being first passed through pairs of rolls provided by hot-press rolls 5 and further through pairs of rolls provided by cold-press rolls 6 in a manner that the adhesive melts by the action of hot-press rolls therebetween and sets between the cold-press rolls due to the action thereof.

The methods shown in figs. 1 and 2 are applicable not only to the fabrication of boards but also to the coating thereof.

By the method of the invention, the plywood fabrication proceeds in a manner that a single-aperture hot press is furnished with a three-veneer plywood blank, the adhesive comprising a thermoplastic film. This step proceeds the same way as the present plywood fabrication, when using a so-called film adhesive. The necessary pressure is 0,6 MPa (6 kp/cm^2) and the plywood blank is retained in hot pressing long enough for the thermoplastic film to soften. Naturally, this period depends on the type of thermoplastic and temperature. It has been experimentally found out that a 1 minute pressing time is sufficient when temperature has been 205°C . During the cold pressing immediately after said hot pressing, the adhesive sets and binds the veneers together as temperature goes down. It has been experimentally found that in cold pressing a pressure of 0,6 MPa (6 kp/cm^2) and a time of 1 minute will be sufficient. Instead of a special cold plate press it is possible to use roller or roll pressing shown in fig. 2 and/or stack pressing for pressing a plurality of sheets on top of each other in a thick stack between pressing plates.

Thicker plywoods can be fabricated e.g. in a manner that first is prepared a 3-veneer plywood and one veneer is glued to either side of said plywood until a desired thickness is reached. Furthermore, a



production line may comprise successively a plurality of hot- and cold-pressing steps for stepwise growing the plywood to a desired thickness.

5 The adhesive films 1 shown in fig. 1 can be made of a conventional, thermoplastic film. If desired, however, the plastic film used as an adhesive can be provided on either one or both sides with adhesive in a manner that the film can be kept in fixed position during a fabrication process. Such
10 a 1- or 2-sided adhesive equipped adhesive film is practical especially for extending the veneers and for gluing a chafing strip or bead to the edge of a board during the coating thereof. A two-sided adhesive tape is especially advantageous for gluing a
15 chafing strip. Gluing is then effected in a manner that a plastic film is first glued to the edge of a board by means of an adhesive layer on the film and the chafing or edging strip is fastened on top of the film by means of the adhesive on said film. Thus, a
20 chafing strip can be readily fastened to its proper position and it remains fixed during the transfers and work. The final gluing of a chafing strip to a board is effected as set out above by the application of heat and pressure.

25 Hot pressing temperature may vary between 100 and 250°C, measured on the surface of the press. When using polyeten or polyamide pressing temperatures between 150 and 170°C and 230-250°C resp. are proper.

30 Cold pressing may be carried out in room temperature (i.e. 20±10°C) or a cooled or a not cooled press may be used; pressing time e.g. between 1 min and 25 hours resp.

Thermoplastic adhesive may be composed of polypropen, polyeten, polyamide etc.



The specification and enclosed work examples only disclose a few applications of the invention and the work examples are only intended to illustrate the invention without limiting it in any way.

5



CLAIMS

1. A method for the fabrication and coating boardlike articles, whereby to a sheet layer (2) is glued another sheet layer (2), c h a r a c t e r - i z e d in that the gluing of sheet layer (2) is effected by means of a thermoplastic adhesive by the application of two-step pressing in a manner that said adhesive is placed between sheet layers (2) to be joined as a solid film (1), the sheet layers are compressed together in hot pressing in a manner that the adhesive melts to liquid state, and the sheet layers are compressed together in cold pressing in a manner that temperature of the adhesive goes down and the adhesive sets for binding the sheet layers together.

2. A method as set forth in claim 1, c h a r a c t e r i z e d in that sheet layers (2) are compressed together in a plate press (3, 4).

3. A method as set forth in claim 1 or 2, c h a r a c t e r i z e d in that the sheet layers are compressed together between pairs of pressing rolls.

4. A method as set forth in claim 3, c h a r a c t e r i z e d in that said pairs of pressing rolls provide a hot press (5) and a cold press (6), and that pressing is effected stepwise in a manner that sheet layers (2) are first passed through the nip of hot press forming pairs of rolls (5) into the nip of cold press forming pairs of rolls (6).

5. A method as set forth in any of the claims 1-4, c h a r a c t e r i z e d in that adhesive is applied at least to one side of plastic film (1) for fixing said plastic film to the sheet layer.

6. A method as set forth in claim 5, c h a r a c t e r i z e d in that adhesive is applied to both sides of plastic film (1) for fixing said



plastic film between two sheet layers.

7. A method as set forth in claim 5 or 6, characterized in that the adhesive applied to said plastic film is sticker adhesive.

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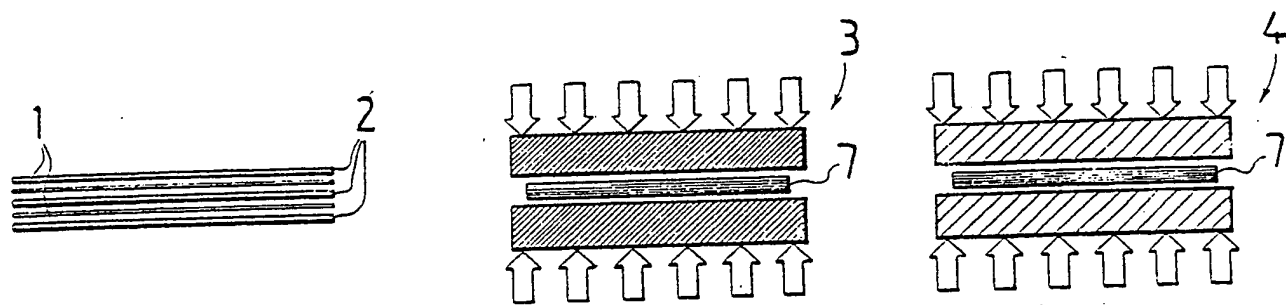


Fig. 1

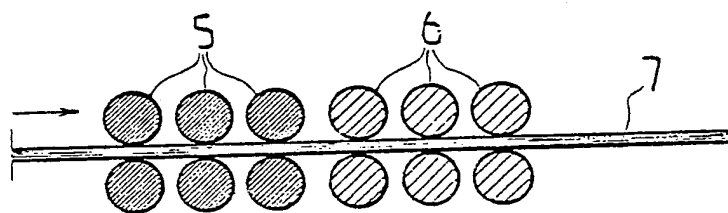


Fig. 2

INTERNATIONAL SEARCH REPORT

International Application No PCT/FI84/00049

I. CLASSIFICATION F SUBJECT MATTER (if several classification symbols apply, indicate all) ¹ According to International Patent Classification (IPC) or to both National Classification and IPC 3 B 27 D 1/00								
II. FIELDS SEARCHED <div style="text-align: center;">Minimum Documentation Searched ⁴</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 20%;">Classification System</th> <th style="width: 80%;">Classification Symbols</th> </tr> </thead> <tbody> <tr> <td>IPC 3</td> <td>B 27 D 1/00-10, 3/00-04; 5/00; 8 32 B 21/08, 21/14; 8 32 B 7/12; C 09 J 5/06, 7/00; 8 32 B 31/20</td> </tr> <tr> <td>US C1</td> <td>144:242, 246-248, 250; 156:311</td> </tr> </tbody> </table> <div style="text-align: center;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁵</div>			Classification System	Classification Symbols	IPC 3	B 27 D 1/00-10, 3/00-04; 5/00; 8 32 B 21/08, 21/14; 8 32 B 7/12; C 09 J 5/06, 7/00; 8 32 B 31/20	US C1	144:242, 246-248, 250; 156:311
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US C1	144:242, 246-248, 250; 156:311							
SE, NO, DK, FI classes as above								
III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴								
Category ⁸	Citation of Document, ¹⁵ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸						
X	DE, A, 2 362 247 (M.SADZOT) 27 June 1974 & NL, 7317009 FR, 2211607 LU, 66926 BE, 809683	1-7						
A	DE, A, 1 948 818 (E.MENGES) 15 April 1971	1-7						
A	FR, B, 853 126 (M.L. RENAULT) 11 March 1940	1-7						
X	GB, A, 1 370 929 (MITSUBISHI PETROCHEMICAL CO LTD AND OOSHICA SHINKOKK) 2 December 1970	1-7						
A	DE, A, 2 011 481 (W.R. HEFFERNAN) 12 November 1970	1-7						
A	US, A, 3 056 440 (R.DE MELLO) 2 October 1962	1-7						
<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>¹⁶ Special categories of cited documents: ¹⁶</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 48%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"Z" document member of the same patent family</p> </div> </div>								
IV. CERTIFICATION								
Date of the Actual Completion of the International Search ¹ 1984-10-01		Date of Mailing of this International Search Report ² 1984-10-05						
International Searching Authority ¹ Swedish Patent Office		Signature of Authorized Officer ¹⁰ Eddy Leopold						

L.E.

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